

MONOPELOPIA CARAGUATA (CHIRONOMIDAE: TANYPODINAE: PENTANEURINI) AND PHYTOTELMATOCLADIUS DELAROSAI (CHIRONOMIDAE: ORTHOCLADIINAE): TWO PHYTOTELMATOUS CHIRONOMIDS DISTRIBUTED FROM FLORIDA TO ARGENTINA

AUGUSTO SIRI* AND MARIANO DONATO

ILPLA (Instituto de Limnología "Dr. Raúl A. Ringuelet") CONICET-CCT-La Plata / UNLP (Universidad Nacional de La Plata). Bv. 120 y 62, La Plata (1900), Buenos Aires, Argentina

*Corresponding author; E-mail: augusto@ilpla.edu.ar

Phytotelmata are structures present in terrestrial plants such as modified leaves, leafaxils, flowers, stem holes or depressions, open fruits and fallen leaves. These structures allow water to impound and are more common in tropical areas where plant diversity and rainfall are higher (Fish 1983). The phytotelmata provide a suitable habitat where immature chironomids are common inhabitants.

In this contribution, the occurrence of the chironomid species *Monopelopia caraguata* Mendes et al. (Chironomidae: Tanypodinae: Pentaneurini) and *Phytotelmatocladius delarosai* Epler (Chironomidae: Orthoclaadiinae) are reported in Argentina for the first time. A list of the American phytotelmatous chironomids (except for species inhabiting tree holes and bamboo internodes) with the host plant and references is presented in Table 1.

Immatures stages of *Monopelopia* Fittkau (Chironomidae: Tanypodinae) have been found living in small bodies of water such as ponds, marshes and streams or phytotelmata. Of the phytotelmatous species, *M. tillandsia* Beck et Beck, *M. mikeschwartzi* Epler, *M. gesta* (Roback), *M. caraguata* Mendez et al. and an undescribed *Monopelopia* species were reported living in the impounded water of bromeliads (Poales: Bromeliaceae) (Cranston 2007; Cranston & Epler 2013). *Monopelopia tillandsia* was reported living in *Tillandsia*, *Catopsis* and *Hohenbergia* in Florida and Cuba (Beck & Beck 1966; Roback 1987; Bello et al. 2011). *Monopelopia mikeschwartzi* and *M. gesta* were reported living in *Aechmea paniculigera* (Swartz) Grisebach (Bromeliaceae) in Jamaica (Epler & Janetzky 1999; Cranston & Epler 2013), whereas the undescribed species of Cranston (2007) was reported living in *Guzmania* in Puerto Rico. *Monopelopia caraguata* was reported developing in species of *Vriesea*, *Nidularium*, *Hohenbergia* and *Aechmea* in southern Brazil (Mendez et al. 2003) and in solution holes in the Everglades National Park, Florida, USA (Jacobsen 2008). Up to present, this species was not found developing in bromeliads in Florida (R. Jacobsen, J. H. Epler and J. H. Frank, personal communication).

The cosmopolitan *Eryngium* L. (Apiaceae) includes more than 200 species distributed in temperate and tropical areas, but these species develop phytotelmata only in southern Brazil and

Argentina (Campos 2010). Plants of this genus grow on the ground and have a simple structure and are annuals, differing from bromeliads, which comprise mainly perennial epiphytic plants with a complex structure.

Larvae of *Monopelopia caraguata* were collected from *Eryngium* plants and reared in the laboratory. This is the first report of this chironomid species associated with the terrestrial *Eryngium* plants in a temperate region. *Monopelopia caraguata* co-occurred in some *Eryngium* plants with *Polypedilum parthenogeneticum* Donato et Paggi (Chironomidae: Chironominae) and *Metriocnemus eryngiotelmatus* Donato et Paggi (Chironomidae: Orthoclaadiinae), which are common inhabitants of *Eryngium* in Argentina.

Phytotelmatocladius (Chironomidae: Orthoclaadiinae) is a monospecific genus described from bromeliad phytotelmata in southern Florida and Brazil (Epler 2010). Because only female adults and pupae have been collected or reared, this author postulated that this taxon could be parthenogenetic. Immatures of *P. delarosai* were recently collected from the impounded water of *Bromelia balansae* Mez (Bromeliaceae) in a botanical garden at FCAyF-UNLP (Facultad de Ciencias Agrarias y Forestales- Universidad Nacional de La Plata, Buenos Aires, Argentina). This bromeliad species is exotic to this region, being native to Paraguay, Brazil and the northeast of Argentina (Zuloaga et al. 2008). Of the reared *P. delarosai*, only female adults emerged, which were maintained in separate vials containing little water. The females laid their eggs which hatched 7 days later; therefore, we confirm the assumption of Epler (2010) that *P. delarosai* could be parthenogenetic.

In the sampling of *Eryngium* plants in FCAyF-UNLP close to *B. balansae* plants, *P. delarosai* was not collected. Besides, *Monopelopia caraguata*, *Metriocnemus eryngiotelmatus* and *Polypedilum parthenogeneticum* were not collected from *B. balansae*, suggesting a possible specificity or preference of those chironomids for each plant species.

Material Examined

Monopelopia caraguata: ARGENTINA, Buenos Aires Province, Punta Lara, ex *Eryngium* sp.

TABLE 1. LIST OF THE PHYTOTELMATOUS CHIRONOMIDS IN THE AMERICAS.

	Taxa	Host plant	Country	References
Orthocladiinae	<i>Antilocladius antecalcus</i>	<i>Nidularium innocentii</i>	Brazil	Pinho et al. 2005
	<i>Cricotopus</i> sp	<i>Eryngium elegans</i>	Argentina	Campos 2010
		<i>Nidularium innocentii</i>	Brazil	Pinho et al. 2005
	<i>Linnophyes</i> sp	<i>Nidularium innocentii</i>	Brazil	Pinho et al. 2005
		<i>Tillandsia guatemalensis</i>	Honduras	Mendez et al. 2011
	<i>Mesosmittia patrihortae</i>	<i>Nidularium innocentii</i>	Brazil	Pinho et al. 2005
	<i>Metriocnemus abdominoflavatus</i>	<i>Tillandsia</i> , <i>Billbergia</i> , <i>Catopsis</i>	Costa Rica	Picado 1913
		<i>Tillandsia utriculata</i>	USA	Fish 1976
	<i>Metriocnemus edwardsi</i>	<i>Darlingtonia</i>	USA	Jones 1916
	<i>Metriocnemus eryngiotelmatus</i>	<i>Eryngium horridum</i> ; <i>E. stenophyllum</i> , <i>E. aff. serra</i> , <i>E. elegans</i> , <i>E. cabreriae</i> , <i>Dipsacus fullonum</i>	Argentina	Donato & Paggi 2005, Siri et al. 2008a,b, Campos 2010
	<i>Metriocnemus knabi</i>	<i>Sarracenia purpurea</i>	USA to Canada	Bradshaw 1983, Nastase et al. 1995
	<i>Metriocnemus</i> sp	<i>Tillandsia turneri</i>	Colombia	Ospina et al. 2004
		<i>Tillandsia guatemalensis</i>	Honduras	Mendez et al. 2011
		<i>Bromeliads</i> , <i>Dipsacus</i>	USA	Epler 2001, Frank & Fish 2008, Miller 1971
		<i>Heliamphora</i> spp	Venezuela	Baumgartner 1986
Tanypodinae	<i>Orthocladius</i> sp	<i>Bromeliads</i>	Costa Rica	Jaffe et al. 1992
	<i>Orthocladiinae</i> sp	<i>Aechmea nudicaulis</i> , <i>Neoregelia concentrica</i>	Brazil	Picado 1913
	<i>Phytotelmatocladius delarosai</i>	<i>Bromelia balansae</i>	Argentina	Sodré et al. 2010
		<i>Bromeliads</i>	Brazil	present study
		<i>Bromeliads</i>	USA	Epler 2010
	<i>Ababesmyia costaricensis</i>	<i>Aechmea</i> , <i>Vriesea</i> , <i>Billbergia</i>	Costa Rica	Epler 2010
	<i>Larsia</i> sp	<i>Eryngium aff. serra</i> , <i>E. elegans</i> , <i>Aechmea distichantha</i>	Argentina	Picado 1913
		<i>Vriesea splitgerberi</i>	Brazil	Campos 2010, pers. obs.
	<i>Monopelopia caraguata</i>	<i>Eryngium</i> spp	Argentina	Torreias 2008
		<i>Aechmea nudicaulis</i> , <i>Hohenbergia augusta</i> , <i>Nidularium innocentii</i> , <i>Vriesea gigantea</i> , <i>V. philippocoburgii</i> , <i>V. vagans</i>	Brazil	present study
		Solution holes	USA	Mendes et al. 2003, Pinho et al. 2005
				Jacobsen 2008, Frank & Fish 2008, Crans-ton & Epler 2013

*As reported by Epler & Janetzky (1999), due to taxonomic changes and the general difficulty involved in identifying Chironomidae, the preceding names from Laessle (1961) must be viewed with skepticism until the material is re-examined. **Nomina dubia (Sæther et al. 2010).

TABLE 1. (CONTINUED) LIST OF THE PHYTOTELMATOUS CHIRONOMIDS IN THE AMERICAS.

Taxa	Host plant	Country	References
<i>Monopelopia gesta</i>	<i>Aechmea paniculigera</i>	Jamaica	Epler & Janetzky 1999, Cranston & Epler 2013
<i>Monopelopia mickeschwartzi</i>	<i>Aechmea paniculigera</i>	Jamaica	Epler & Janetzky 1999
<i>Monopelopia tillandsia</i>	<i>Tillandsia, Catopsis, Hohenbergia</i>	Cuba	Bello et al. 2011
	<i>Tillandsia utriculata, Tillandsia spp</i>	USA	Beck & Beck 1966, Fish 1976, Frank & Fish 2008
<i>Monopelopia</i> sp	Bromeliads, <i>Aechmea nudicaulis, Neoregelia concentrica</i>	Brazil	Winder 1977, Sodré et al. 2010
<i>Pentaneura</i> sp	<i>Catopsis nitida</i>	Puerto Rico	Cranston 2007
	Bromeliads	Brazil	Winder & Silva 1972
	<i>Helicornia</i>	Costa Rica	Naeem 1990
	Bromeliads	Jamaica	Laessle 1961 (*)
	Bromeliads	US Virgin Islands	Miller 1971
Tanypodinae spp	<i>Aechmea fendleri, Hohenbergia stellata</i>	Venezuela	Liria 2007
Chironominae sp	<i>Aechmea fendleri, Hohenbergia stellata</i>	Venezuela	Liria 2007
<i>Chironomus anonymus</i>	<i>Aechmea paniculigera</i>	Jamaica	Epler & Janetzky 1999
<i>Chironomus</i> sp	Bromeliads	Costa Rica	Picado 1913
	Bromeliads	Jamaica	Laessle 1961 (*)
<i>Corynoneura</i> sp	<i>Vriesea splitgerberi</i>	Brazil	Torreias 2008
<i>Cryptochironomus</i> sp	Bromeliads	Jamaica	Laessle 1961 (*)
<i>Polypedium katingangi</i>	<i>Aechmea lindeni, Canistrum lindonii, Neoregelia laevis, Nidularium innocentii, Vriesea philippocoburgii, V. vagans</i>	Brazil	Pinho et al. 2013
<i>Polypedium marcondesi</i>	<i>Nidularium innocentii, Vriesea vagans</i>	Brazil	Saether et al. 2010
<i>Polypedium panacu</i>	<i>Tillandsia guatemalensis</i>	Honduras	Mendes et al. 2011
<i>Polypedium parthenogeneticum</i>	<i>Eryngium pandanifolium</i>	Argentina	Donato & Paggi 2008
<i>Polypedium pedipalpus**</i>	Bromeliads	Costa Rica	Picado 1913, Spies et al. 2009
<i>Polypedium solimoes</i>	<i>Aechmea lindeni, Canistrum lindonii, Neoregelia laevis, Nidularium innocentii, Vriesea philippocoburgii, V. vagans</i>	Brazil	Pinho et al. 2013
<i>Polypedium cf tritum</i>	<i>Aechmea paniculigera</i>	Jamaica	Epler & Janetzky 1999
<i>Polypedium</i> spp	<i>Eryngium horridum; E. stenophyllum, E. aff. serra, E. elegans, E. cabreriae</i>	Argentina	Siri et al. 2008b, Campos 2010

*As reported by Epler & Janetzky (1999); due to taxonomic changes and the general difficulty involved in identifying Chironomidae, the preceding names from Laessle (1961) must be viewed with skepticism until the material is re-examined. **Nomina dubia (Saether et al. 2010).

TABLE 1. (CONTINUED) LIST OF THE PHYTOTELMATOUS CHIRONOMIDS IN THE AMERICAS.

Taxa	Host plant	Country	References
	<i>Nidularium innocentii</i> , <i>Vriesea vagans</i> , <i>V. splitgerberi</i> , <i>Aechmea nudicaulis</i> , <i>Neoregelia concentrica</i>	Brazil	Pinho et al. 2005, Torreias 2008, Sodré et al. 2010
<i>Rheocricotopus</i> sp	<i>Musa</i>	Costa Rica	Lichtwardt 1994
<i>Stenochironomus atlanticus</i>	<i>Tillandsia turneri</i>	Colombia	Ospina et al. 2004
	<i>Canistrum lindenii</i> , <i>Neoregelia laevis</i> , <i>Nidularium innocentii</i> , <i>Vriesea philippocoburgii</i> , <i>V. vagans</i>	Brazil	Pinho et al. 2005
<i>Tanytarsini</i> sp	<i>Nidularium innocentii</i>	Brazil	Pinho et al. 2005
	<i>Tillandsia utriculata</i>	USA	Fish 1976
<i>Tanytarsus bromelicola</i>	<i>Guzmania berteroniana</i>	Puerto Rico	Cranston 2007
	<i>Tillandsia</i>	USA	Cranston 2007
<i>Tanytarsus</i> sp. nr <i>confusa</i>	Bromeliads	US Virgin Islands	Miller 1971
<i>Tanytarsus</i> sp	<i>Vriesea splitgerberi</i>	Brazil	Torreias 2008

*As reported by Epler & Janetzky (1999); due to taxonomic changes and the general difficulty involved in identifying Chironomidae, the preceding names from Laessle (1961) must be viewed with skepticism until the material is re-examined. **Nomina dubia (Sether et al. 2010).

S 34° 51' 10" W 57° 57' 33", 7 m asl, adult male reared from larva, 4-VIII-2004, Donato col.; Adult female reared from larva, same data except for Jan 2008; ARGENTINA, Buenos Aires province, Punta Lara, ex *Eryngium* sp. S 34° 54' 37" W 57° 55' 34", 14 m asl, adult male reared from larva, 10-IX-2013, Donato & Siri cols.

Phytotelmatocladus delarosai: ARGENTINA, Buenos Aires province, La Plata, ex *Bromelia balansae* Mez at the Jardín Botánico y Arboretum, Facultad de Ciencias Agrarias y Forestales (FCAyF) (UNLP), S 34.912881° W 57.9332227°, adult female reared from larva, collected 9-VIII-2012, emerged 18-VIII-2012, laid their eggs which hatched on 25/26-VIII-2012, Donato & Siri cols.

The authors thank Mónica Caviglia for the proof reading. The paper is Scientific Contribution N° 943 of the ILPLA.

SUMMARY

The geographic distribution of the 2 phytotelmatous chironomids *Monopelopia caraguata* and *Phytotelmatocladus delarosai* is found to extend southward into Argentina, and the occurrence of parthenogenesis in the latter species is corroborated under laboratory conditions.

Key Words: Apiaceae, Bromeliaceae, *Catopsis*, *Eryngium*, *Hohenbergia*, *Tillandsia*, parthenogenesis

RESUMEN

Se extiende la distribución geográfica de las especies fitotelmatas *Monopelopia caraguata* y *Phytotelmatocladus delarosai* hacia el sur en Argentina, y se corrobora bajo condiciones de laboratorio la ocurrencia de partenogénesis en esta última especie.

Palabras Clave: Apiaceae, Bromeliaceae, *Catopsis*, *Eryngium*, *Hohenbergia*, *Tillandsia*, partenogénesis

REFERENCES CITED

- BAUMGARTNER, D. L. 1986. Failure of mosquitoes to colonize teasel axils in Illinois. *J. American Mosq. Control Assoc.* 2: 371-373.
- BECK, W. M. JR., AND BECK, E. C. 1966. Chironomidae (Diptera) of Florida - I. Pentaneurini (Tanypodinae). *Bull. Florida State Mus., Biol. Sci. Ser.* 10: 305-379.
- BELLO, G., ORESTES, C., AND TORRES, Y. 2011. *Monopelopia tillandsia*, (Diptera: Chironomidae: Tanypodinae), primer registro para Cuba y el Neotrópico. *Rev. Colombiana Entomol.* 37(1): 162-163.
- BRADSHAW, W. E. 1983. Interactions between the mosquito *Wyeomyia smithii*, the midge *Metriocnemus knabi*, and their carnivorous host *Sarracenia*, pp. 161-189 *In* J. H. Frank and L. P. Lounibos [eds.], *Phytotelmata: terrestrial plants as hosts for aquatic insect communities*. Plexus Publishing Inc., Medford, NJ.
- CAMPOS, R. E. 2010. *Eryngium* (Apiaceae) phytotelmata and their macro invertebrate communities, including a review and bibliography. *Hydrobiologia* 652(3): 311-328.
- CRANSTON, P. S. 2007. A new species for a bromeliad phytotelm-dwelling *Tanytarsus* (Diptera: Chironomidae). *Ann. Entomol. Soc. America* 100(5): 617-622.
- CRANSTON, P. S., AND EPLER, J. H. 2013. The larvae of Tanypodinae (Diptera: Chironomidae) of the Holarctic Region — Keys and diagnoses, pp. 39-135 *In* T. Andersen, P. Cranston and J. H. Epler [eds.], *Chironomidae of the Holarctic region - Keys and diagnoses. Part 1. Larvae Ins. Syst. Evol. Supplement* 66.
- DONATO, M., AND PAGGI, A. C. 2005. A new Neotropical species of the genus *Metriocnemus* van der Wulp (Chironomidae: Orthoclaadiinae) from *Eryngium* L. (Apiaceae) phytotelmata. *Zootaxa* 1050: 1-14.
- DONATO, M., AND PAGGI, A. C. 2008. *Polypedilum parthenogeneticum* (Diptera: Chironomidae): a new parthenogenetic species from *Eryngium* L. (Apiaceae) phytotelmata. *Aquat. Insect.* 30: 51-60.
- EPLER, J. H., AND JANETZKY, W. 1999. A new species of *Monopelopia* (Diptera: Chironomidae) from phytotelmata in Jamaica, with preliminary ecological notes. *J. Kansas Entomol. Soc.* 71: 216-225.
- EPLER, J. H. 2001. Identification manual for the larval Chironomidae (Diptera) of North and South Carolina. A guide to the taxonomy of the midges of the southeastern United States, including Florida. Special Publ. SJ2001-SP13. North Carolina Dept. Environ. Nat. Resour., Raleigh, NC, and St. Johns River Water Mgt. District, Palatka, FL. 526 pp. <http://home.earthlink.net/~johnnepler/index.html>.
- EPLER, J. H. 2010. *Phytotelmatocladus*, a new genus from bromeliads in Florida and Brazil (Diptera: Chironomidae: Orthoclaadiinae), pp. 285-293 *In* L. C. Ferrington Jr. [ed.] *Proc. XV Intl. Symp. Chironomidae*. Chironomidae Research Group, Univ. Minnesota, St. Paul, MN. 385 pp.
- FISH, D. 1976. Structure and composition of the aquatic invertebrate community inhabiting epiphytic bromeliads in south Florida and the discovery of an insectivorous bromeliad. Ph.D. Dissertation, University of Florida.
- FISH, D. 1983. Phytotelmata: flora and fauna, pp. 1-27 *In* J. H. Frank and L. P. Lounibos [eds.], *Phytotelmata: Terrestrial Plants As Hosts For Aquatic Insect Communities*. Plexus, Medford, New Jersey, USA.
- FRANK, J. H., AND FISH, D. 2008. Potential biodiversity loss in Florida bromeliad phytotelmata due to *Metamasius callizona* (Coleoptera: Dryophthoridae), an invasive species. *Florida Entomol.* 91(1): 1-8.
- JAFFE, K., MICHELANGELO, F., GONZALEZ, J. M., MIRAS, B., AND RUIZ, M. C. 1992. Carnivory in pitcher plants of the genus *Heliamphora* (Sarraceniaceae). *New Phytol.* 122(4): 733-744.
- JACOBSEN, R. E. 2008. A Key to the Pupal Exuviae of the Midges (Diptera: Chironomidae) of Everglades National Park, Florida: U.S. Geological Survey Scientific Investigations Report 2008-5082, 119 pp.
- JONES, F. M. 1916. Two insect associates of the California pitcher plant *Darlingtonia californica* (Diptera). *Entomol. News.* 27: 385-392.
- LAESSLE, A. M. 1961. A microlimnological study of Jamaican bromeliads. *Ecology* 42: 499-517.
- LICHTWARDT, R. W. 1994. Trichomycete fungi living in the guts of Costa Rican phytotelm larvae and other lentic dipterans. *Rev. Biol. Trop.* 42: 31-48.

- LIRIA, J. 2007. Fauna fitotelmata en las bromelias *Aechmea fendleri* André y *Hohenbergia stellata* Schult del Parque Nacional San Esteban, Venezuela. *Rev. Peru. Biol.* 14: 33-38.
- MENDES, H. F., MARCONDES, C. B., AND PINHO, L. C. 2003. A new phytotelmatic species of *Monopelopia* Fittkau, 1962 (Insecta: Diptera: Chironomidae: Tanypodinae) from south Brazil. *Zootaxa* 262: 1-10.
- MENDES, H. F., ANDERSEN, T., AND JOQUÉ, M. 2011. A new species of *Polypedilum* Kieffer from bromeliads in Parque Nacional Cusuco, Honduras (Chironomidae: Chironominae). *Zootaxa* 3062: 46-54.
- MILLER, A. C. 1971. Observation on the Chironomidae (Diptera) inhabiting the leaf axils of two species of Bromeliaceae on St. John, U.S. Virgin Islands. *Canadian Entomol.* 103: 391-396.
- NAEEM, S. 1990. Resource heterogeneity and community structure: a case study in *Heliconia imbricate* phytotelmata. *Oecologia* 84: 29-38.
- NASTASE, A. J., DE LA ROSA, C., AND NEWELLS, S. J. 1995. Abundance of pitcher-plant mosquitoes, *Wyeomyia smithii* (Coq.) (Diptera: Culicidae) and midges, *Metriocnemus knabi* Coq. (Diptera: Chironomidae), in relation to pitcher characteristics of *Sarracenia purpurea* L. *American Midl. Nat.* 1331: 44-51.
- OSPINA BAUTISTA, F., ESTÉVEZ VERÓN, J., BETANCUR, J., AND REALPE REBOLLEDO, E. 2004. Estructura y composición de la comunidad de macro invertebrados acuáticos asociados a *Tillandsia turneri* Baker (Bromeliaceae) en un bosque alto andino colombiano. *Acta Zool. Mexicana (Nueva Serie)* 20: 153-166.
- PICADO, C. 1913. Les broméliacees épiphytes. Considérées comme milieu biologique. *Bull. Sci. Fr. Belg.*, 47: 215-360.
- PINHO, L. C., MENDES, H. F., AND MARCONDES, C. 2005. A new Brazilian species of *Stenochironomus* Kieffer mining decayed leaves in bromeliads (Diptera: Chironomidae). *Zootaxa* 1046: 37-47.
- PINHO, L. C., MENDES, H. F., ANDERSEN, T., AND MARCONDES, C. 2013. Bromelicolous *Polypedilum* Kieffer from South Brazil (Diptera: Chironomidae). *Zootaxa* 3652: 569-581.
- ROBACK, S. S. 1987. The larval stage of *Monopelopia tillandsia* Beck and Beck (Diptera: Chironomidae: Tanypodinae). *Notulae Naturae* 467: 1-3.
- SAETHER, O. A., ANDERSEN, T., PINHO, L. C., AND MENDES, H. F. 2010. The problems with *Polypedilum* Kieffer (Diptera: Chironomidae), with the description of *Probolum* subgen. n. *Zootaxa* 2497: 1-36.
- SIRI, A., DONATO, M., AND PAGGI, A. C. 2008a. New phytotelmic habitat of *Metriocnemus eryngiotelmatus* (Diptera: Chironomidae). *Rev. Soc. Entomol. Argentina* 67: 113-115.
- SIRI, A., MARTI, G. A., AND LÓPEZ LASTRA, C. C. 2008b. Prevalence of Harpellales from Chironomidae larvae in phytotelmata from Punta Lara Forest, Argentina. *Mycologia* 100(3): 381-386.
- SODRÉ, V., ROCHA, O., AND MESSIAS, M. 2010. Chironomid larvae inhabiting bromeliad phytotelmata in a fragment of the Atlantic Rainforest in Rio de Janeiro State. *Brazilian J. Biol.* 70(3): 587-592.
- SPIES, M., ANDERSEN, T., EPLER, J. H., AND WATSON JR., C. N. 2009. Chironomidae (non-biting midges), pp. 437-480 *In* B. V. Brown, A. Borkent, J. M. Cumming, D. M. Wood, N. E. Woodley and M. Zumbado [eds.], *Manual of Central American Diptera*. NRC Research Press, Ottawa, Ontario, Canada.
- TORREIAS, S. R. S. 2008. Macro invertebrados associados a *Vriesea splitgerberi* (Mez) L. B. & Pitten, (1953) (Bromeliaceae) em uma floresta de campinarana na reserva florestal Adolpho Ducke, Amazonia Centra. *Dissertação de Mestrado*, Inst. Nacl. Pesquisas da Amazônia, Univ. Federal do Amazonas, Manaus, 92 pp.
- WINDER, J. A. 1977. Field observations on Ceratopogonidae and other Diptera (Nematocera) associated with cocoa flowers in Brazil. *Bull. Entomol. Res.* 61: 651-655.
- WINDER, J. A., AND SILVA, P. 1972. Cacao pollination: Microdiptera of cacao plantations and some of their breeding places. *Bull. Entomol. Res.* 61: 651-655.
- ZULOAGA, F., MORRONE, O., AND BELGRANO, M. 2008. Catálogo de las Plantas Vasculares del Cono Sur. <http://www2.darwin.edu.ar/Proyectos/FloraArgentina/FA.asp>